

### CLAIMS

1. A sewage aeration turbocompressor for continuously delivering air to a sewage sludge treatment plant, comprising a compressor having a housing, an impeller mounted on an impeller shaft within the housing, and an electric motor having an output shaft coupled to and rotating in synchronism with the impeller shaft, the housing defining an axial air inlet extending to the impeller, a diffuser passageway extending radially outwards from the impeller, and a volute extending from the diffuser to an air outlet, wherein the electric motor is a variable speed permanent magnet motor controlled by an inverter, the motor is designed to drive the compressor at speeds within a range limited by maximum and minimum design speeds, the compressor is a fixed geometry compressor with a vaneless diffuser designed to deliver a pressure rise between the inlet and outlet of not more than 1500 millibar when the motor is driven at the maximum design speed, and the compressor is designed to deliver maximum efficiency when the motor is driven at a speed less than the maximum design speed.
2. A sewage aeration turbocompressor according to claim 1, wherein the compressor is designed to deliver a pressure rise of between 850 millibar when the motor is driven at the minimum design speed and 1200 millibar when the motor is driven at the maximum design speed.
3. A sewage aeration turbocompressor according to any preceding claim, wherein the diffuser is an annular passageway of uniform width in the axial direction.
4. A sewage aeration turbocompressor according to claim 1, 2 or 3, wherein the inverter is controlled by an oxygen demand sensor arranged to monitor the oxygen content of sludge in the sludge treatment plant.
5. A sewage aeration turbocompressor substantially as hereinbefore described with reference to the accompanying drawings.